Changes in Social Networks after Retirement: Comparison of the USA and European Countries

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ABSTRACT

The aging process includes a fundamental change in social networks, but few prior studies have considered the causal mechanism by which life events affect social network changes. In this study, we investigate how the experience of retirement alters social networks using the data from nationally-representative studies on older adults in the USA and 14 European Countries. Using country-specific pension eligibility as an instrumental variable, we show that retirement causes an increase in social network size and contact with kin members along with a decrease in contact with non-kin members. Next, we plan to examine cross-regional differences in retirement effects and discuss mechanisms by which social networks are adjusted to the new environment after retirement.

INTRODUCTION

How do social relationships change throughout the life course? Whereas the early theory assumes that the "disengagement" from social positions and activities in middle-age life is a part of natural and desirable aging process (Cumming & Henry, 1961), there has been a consistent backlash to such illustration of aging as a monotonic regression from early lifestyles. For example, the activity theory posits that the successful aging has a variety of dimensions, one of which would be the maintenance of active engagement in social activities rather than the withdrawal from the society (Havighurst, 1961). Recent studies show that changes in social relationships reflect coping strategies employed in reaction to the decrease in physical ability and various life events: some try to compensate the decrease in size of social networks by concentrating their energy on important relationships (Carstensen, 1992), and others increase their participation in religious activities and volunteering for compensating their losses of social networks (Cornwell, Laumann, & Schumm, 2008). Antonucci and Akiyama (1987) coined the term "convoy" to explain such transitions: an individual is always embedded in a group of people who provide essential support for continuing one's everyday life, and the aging process can be described as a continuous modification of those support networks in accordance with one's changing needs. From this perspective, late life transitions in social relationships seem to be more dynamic and contextual than early theoretical frameworks expected.

This study investigates how the experience of retirement alters social networks in later life. Previous studies show that retirement has only a trivial impact on the size of social networks but may change the composition of network members by shifting more emphasis to people who are physically closer to the retired persons. The analysis using the data from 16 European countries by Fletcher (2014) found no meaningful effect of retirement on social network size and satisfaction. According to the studies on Dutch data, however, retirees supplement the decrease in work-related networks by making new relationship among themselves, which results in a little impact of retirement on the overall network size (Van Tilburg, 1992, 2003). We revisit this topic with updated data from the USA and 14 European countries. We especially focus on addressing two issues.

1) Retirement is a highly non-random process, which makes it hard to identify its causal effect on social networks. For example, Szinovacz, DeViney, and Davey (2001) show that older adults with higher economic or caring obligations for their family members are less

likely to decide on retirement. If our analytic model does not fully consider those factors, the retirement effect might be overestimated when considering non-familial networks. We can also think about the reverse causation from social networks to retirement. Litwin and Tur-Sinai (2015) show that the probability of early retirement is higher for those with larger social networks and more frequent social interaction. In this situation, the traditional regression models cannot identify the direction of causality. For addressing those problems, we adopt country-specific old-age pension eligibility as an instrument for retirement (Coe & Zamarro, 2011; Mazzonna & Peracchi, 2017; Rohwedder & Willis, 2010).

2) Social network changes in response to retirement may show different patterns by regional context. Since the pension system is country-specific and designed to provide economic support to its citizens, retirement may put older adults into economic and social situations that vary systematically across countries. Previous studies emphasize that social networks in Mediterranean countries are more family-based than counterparts in Europe (Kalmijn & Saraceno, 2008; Litwin, 2009), which may shape different "convoys" in later life. We consider such heterogeneity in retirement effects by examining our IV regression models separately by country and region (i.e., America, Western Europe, Southern Europe, Eastern Europe) and comparing how the effects of retirement differ across pension regimes.

ANALYTIC STRATEGY

The goal of this study is to identify the causal effect of retirement on social network changes in later life. We start with a cross-sectional analysis considering the association between social network characteristics and retirement using the following OLS estimator:

$$S_{icbt} = \beta_1 R_{icbt} + \beta_2 X_{icbt} + \beta_3 C_c + \beta_4 B_b + \beta_5 T_t + \beta_6 C_c A_{icbt} + \beta_7 C_c A^2{}_{icbt} + u_{icbt}$$

S_{icbt} and R_{icbt} denote one of social network characteristics (e.g., social network size, contact frequency) and retirement of individual i from country c, birth cohort b, and survey year t respectively. X_{icbt} is a vector of exogenous characteristics which are likely to be determined before the formation of social networks and retirement (i.e., gender, foreign-born status, education, the number of children). We incorporate country, cohort, and survey-year fixed effects (i.e., C_c, B_b, T_t), which enables us to do within-country comparison after purging out the effect of the unobservable which are common for the same cohort and survey-

year groups across countries. We additionally control for country-specific linear and quadratic aging trends (i.e., $C_c A_{icbt}$, $C_c A^2{}_{icbt}$) which may not be captured by cohort or survey-year fixed effects. Hereafter we include fixed effects and aging trends in X_{icbt} for simplicity.

The estimate for β_1, however, may be biased to the correlation between retirement R and the error term u in the equation above. For addressing this issue, we use the pension eligibility age as an instrument for retirement. Considering the binary nature of retirement, we follow the three-step approach proposed by Wooldridge (2010) as follows:

$$R^*{}_{icbt} = \Phi[\delta_1 EP_{ct} + \delta_2 FP_{ct} + \delta_3 X_{icbt}]$$

$$R_{ict} = \alpha_1 R^*{}_{icbt} + \alpha_2 X_{icbt} + \varepsilon_{icbt}$$

$$S_{icbt} = \beta_1 \widehat{R}_{icbt} + \beta_2 X_{icbt} + u_{icbt}$$

First, we adopt two binary indicators EP_{ct} and FP_{ct} which are set to 1 when A_{icbt} is greater than or equal to early- or full-pension eligibility age[1] and estimate a probability of retirement $R^*{}_{icbt}$ using a probit regression. Second, we estimate an OLS regression of R_{ict} on $R^*{}_{icbt}$ instead of EP_{ct} and FP_{ct} themselves with X_{icbt}. Third, we plug in the fitted value $\widehat{R}_{icbt}$ instead of R_{ict} in the final stage regression. Under the assumption of a strong first stage (i.e., pension eligibility is strongly associated with retirement) and exclusion restriction (i.e., pension eligibility influences social networks only through the actual experience of retirement), β_1 provides an unbiased estimate for the causal effect of retirement which is induced by country-specific pension eligibility.

Next, we conduct the longitudinal analysis for the effect of retirement on social network changes between two time points t_1 and t_2. In this analysis, we limit our study sample to those who did not retire at t_1 and check if the experience of retirement between t_1 and t_2 causes any change in social networks. The equations are as follows:

$$R^*{}_{icbt_2} = \Phi[\delta_1 EP_{ct_2} + \delta_2 FP_{ct_2} + \delta_3 X_{icbt_1}]$$

$$R_{icbt_2} = \alpha_1 R^*{}_{icbt_2} + \alpha_2 X_{icbt_1} + \varepsilon_{icb}$$

[1] The full-pension age is defined as the minimum age when the full pension is possible. While in many countries have additional conditions by which citizens can pursue early retirement with some reduction in the amount of pension, we set the same value for early-pension age with full-pension age if there is no specific condition for early retirement (e.g., Poland).

$$S_{icbt_2} - S_{icbt_1} = \beta_1 \widehat{R}_{icbt_2} + \beta_2 X_{icbt_1} + u_{icb}$$

In this model, we estimate the effect of retirement which took place between time t_1 and t_2 (R_{icbt_2}) by using pension eligibility at time t_2 (i.e., EP_{ct_2}, FP_{ct_2}) as instruments. The outcome is the change in social networks between t_1 and t_2.

Additionally, we reconsider cross-sectional and longitudinal analyses above separately for each country or region to investigate the contextual differences in retirement effects.

DATA

The data are from two studies: the National Social Life, Health, and Aging Project (NSHAP) and the Survey of Health, Ageing and Retirement in Europe (SHARE). Both studies have recruited and longitudinally followed up samples that are representative of older adults in the USA and European countries. In this study, we use the data from the NSHAP wave 2 (2010-2011) and 3 (2015-2016), and the SHARE wave 4 (2010-2012) and 6 (2015) for investigating the effect of retirement on cross-sectional difference and longitudinal changes in social networks and family structure.

Retirement is from the survey questionnaire about working status. Since we are mainly interested in the effect of unemployed status on social networks and family in later

Table 1. Proportion of retired respondents according to pension eligibility

Region	Country	< Early-pension age	≥ Early-pension age & < Full-pension age	≥ Full-pension age
America	USA	0.31	0.55	0.75
Northern Europe	Sweden	0.09	0.33	0.93
	Denmark	0.09	0.46	0.91
	Estonia	0.18	0.39	0.81
Western Europe	Austria	0.26	0.74	0.98
	Germany	0.19	0.76	0.97
	France	0.15	0.46	0.96
	Switzerland	0.14	0.40	0.90
	Belgium	0.22	0.74	0.98
Southern Europe	Spain	0.23	0.64	0.98
	Italy	0.18	0.74	0.96
	Portugal	0.34	0.66	0.97
Eastern Europe	Czech Republic	0.32	0.65	0.98
	Poland	0.49	-	0.98
	Slovenia	0.27	0.86	0.98
Total		0.22	0.61	0.93

life, we consider those who are not holding any paying jobs as retirees. The information about *pension eligibility age*s is from OECD pamphlets (OECD, 2011, 2013, 2015, 2017) and relevant Acts in each country. Table 1 shows that 61% and 93% of older adults are in a retired status corresponding to early and full pension eligibility.

The main reason we depend on those data is the same network module called "name generator" which collects the extensive information about people with whom the respondents often discuss "important matters" (Burt, 1984; Cornwell, Schumm, Laumann, & Graber, 2009; Litwin, Stoeckel, Roll, Shiovitz-Ezra, & Kotte, 2013). We measure *social network size* by counting the number of network members enumerated in the module and *contact frequency* by averaging days the respondent had contact with each member in the past year (e.g., 0 = no interaction; 365 = every day). For considering network composition in detail, we additionally examine size and contact frequency by relationship type: coresidents, non-coresiding kin members, and non-coresiding non-kin members.[2]

As for social activities, we consider the level of participation in *volunteering* and *group meeting* (e.g., a choir, a committee or board, a sports or exercise group) by taking days the respondent spent in the past year for each activity. As for family structure, we consider *partner status* (i.e., any spouse or partner living in the same household) and *household size* (i.e., the number of coresidents in the same household).

PRELIMINARY RESULTS

Table 2 shows descriptive statistics. Older adults in our study sample enumerated 2.43 social network members on average, while 0.75, 1.03, and 0.65 are coresidents, non-coresiding kin members, and non-coresiding non-kin members respectively.

Table 3 contains the results from the first-stage regression. For comparing the first stage based on an OLS regression setting, we provide results from both OLS and probit regression. F-statistics are about 135 for the cross-sectional analysis and 26 for the longitudinal analysis, which shows reasonably strong first stages.

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[2] The SHARE network module does not ask the frequency of interaction with coresidents, so we give the value 1 for all coresidential relationship. Since there is no variation in contact frequency among coresiding network members, we do not examine it as an outcome for an IV regression.

Table 3. Descriptive Statistics

Variable		N	Mean	SD	Min	Max
Social network size	Overall	75,350	2.43	1.44	0	5
	Coresident	75,350	0.75	0.63	0	5
	Kin	75,350	1.03	1.15	0	5
	Non-kin	75,350	0.65	1.00	0	5
Contact frequency	Overall	74,863	243.58	115.77	0	365
	Kin	74,536	104.33	129.04	0	365
	Non-kin	74,868	54.32	99.15	0	365
Social activity	Volunteering	77,892	9.16	30.89	0	182.5
	Group meeting	77,887	22.96	46.39	0	182.5
Partnered		79,163	0.77	0.42	0	1
Household size		79,161	2.15	1.03	0	12
Age		79,163	63.14	6.93	50	75
Female		79,163	0.53	0.50	0	1
Foreign born	No	79,163	0.89	0.31	0	1
	Yes	79,163	0.10	0.29	0	1
	Missing	79,163	0.01	0.12	0	1
Post-secondary education	No	79,163	0.67	0.47	0	1
	Yes	79,163	0.32	0.47	0	1
	Missing	79,163	0.01	0.12	0	1
Number of children		79,163	2.14	1.33	0	40

Table 4 shows the results from OLS and IV regression of social networks, social activities, and family structure on retirement. The cross-sectional analysis shows that retirement causes a 0.145 increase in kin network size, a 20-day increase in the frequency of contact with kin members, and a 14-day decrease in contact with non-kin members. While there is a 9-day increase for volunteering and a 7-day increase for a group meeting, the probability of being partnered increases about 9% after retirement. Overall, older adults are more likely to cultivate larger and intense social networks with kin members and weaker relationship with non-kin members after retirement, while spending more time in social activities. As for longitudinal analyses, however, we do not find any meaningful evidence of

Table 2. First-stage regression

Estimator	(1) OLS	(3) OLS	(4) Probit	(6) Probit
≥Early-pension age	0.130***	0.064*	0.235***	0.182*
	(0.015)	(0.028)	(0.034)	(0.083)
≥Full pension eligibility	0.146***	0.195***	0.486***	0.547***
	(0.013)	(0.028)	(0.041)	(0.081)
N	79163	9086	79163	9086
(Pseudo) R^2	0.511	0.295	0.464	0.248
F	135.090	25.639		
Chi^2			203.266	50.718

Note: Standard errors in parentheses, clustered at the level of country-cohort. All models control for gender, foreign-born status, education, number of children, country fixed effects, cohort fixed effects, survey-year fixed effects, and country-specific linear and quadratic aging trends.
* p<0.05 ** p<0.01 *** p<0.001.

retirement effect from IV regression.

Next, we plan to i) investigate cross-regional differences in retirement effects by re-considering our cross-sectional and longitudinal analyses above separately for each country or region, ii) divide our study sample based on household or individual characteristics (e.g., education, number of children, household income, prior social networks) and check if there is any heterogeneity in retirement effect, and iii) elaborate our models by adopting more appropriate functional forms for the regression of each outcome.

Table 4. OLS and IV regression of Social Networks and Family Structure on Retirement

		Social network size				Contact frequency			Social activity		Family structure	
		(1) Overall	(2) Coresident	(3) Kin	(4) Non-kin	(5) Overall	(6) Kin	(7) Non-kin	(8) Volunteering	(9) Group meeting	(10) Partnered	(11) Household size
1. Cross-sectional analysis	OLS	-0.023	-0.002	0.029*	-0.050***	-3.840**	0.510	-10.947***	2.925***	0.054	0.001	-0.044***
		(0.014)	(0.007)	(0.012)	(0.010)	(1.184)	(1.347)	(1.043)	(0.321)	(0.474)	(0.004)	(0.009)
	IV	0.132	0.056	0.145*	-0.069	4.562	20.533**	-13.947**	9.255***	6.720**	0.085***	0.069
		(0.071)	(0.032)	(0.059)	(0.050)	(5.905)	(6.716)	(5.193)	(1.575)	(2.325)	(0.021)	(0.047)
	N	75350	75350	75350	75350	74863	74536	74868	77892	77887	79163	79161
2. Longitudinal analysis	OLS	0.029	0.014	0.007	0.008	-7.692*	6.527	-15.332***	3.666***	6.043***	0.002	0.001
		(0.041)	(0.018)	(0.033)	(0.028)	(3.228)	(3.829)	(3.242)	(0.811)	(1.390)	(0.019)	(0.006)
	IV	0.099	-0.149	0.151	0.097	-34.131	-10.617	-2.780	8.756	-4.854	-0.089	0.079
		(0.301)	(0.133)	(0.240)	(0.208)	(23.691)	(27.997)	(23.836)	(5.949)	(10.208)	(0.143)	(0.045)
	N	9077	9077	9077	9077	8958	8825	8975	8927	8922	9085	9086

Note: Standard errors in parentheses, clustered at the level of country-cohort. All models control for gender, foreign-born status, education, number of children, country fixed effects, cohort fixed effects, survey-year fixed effects, and country-specific linear and quadratic aging trends.
* p<0.05 ** p<0.01 *** p<0.001.

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